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Rangan, Amar, Pitchford, James, Williams, Penny et al. (2 more authors) (2017) Standardisation of delivery and assessment of research training for specialty trainees based on curriculum requirements : recommendations based on a scoping review. BMJ Open. e013955. ISSN 2044-6055

<https://doi.org/10.1136/bmjopen-2016-013955>

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BMJ Open Standardisation of delivery and assessment of research training for specialty trainees based on curriculum requirements: recommendations based on a scoping review

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To cite: Rangan A, Pitchford J, Williams P, *et al*. Standardisation of delivery and assessment of research training for specialty trainees based on curriculum requirements: recommendations based on a scoping review. *BMJ Open* 2017;7:e013955. doi:10.1136/bmjopen-2016-013955

► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2016-013955>).

Received 24 August 2016
Revised 24 October 2016
Accepted 19 December 2016



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ABSTRACT

Objectives: (1) To conduct a scoping review of postgraduate specialty training (ST) curricula for doctors within Health Education England in order to identify common themes and variations in requirements for training and assessment of research competencies. (2) To make recommendations on standardisation of training for clinical research across ST programmes.

Setting: Health Education England North East and National Institute for Health Research Clinical Research Network (CRN)—North East and North Cumbria.

Methods: Annual Review of Competence Progression (ARCP); Certificate of Completion of Training (CCT) checklists and curricula for ST were obtained from Health Education England North East and reviewed between June and September 2015. Research competence requirements based on knowledge, skills or behaviour-based domains were identified and entered onto a spreadsheet for analysis. Common themes with levels of competence required were identified. This information was used to construct and propose a model for delivery of training in clinical research across ST programmes.

Results: Sixty-two ST curricula were reviewed and seven common themes for research training were found in up to 97% of the curricula. Requirement for good clinical practice (GCP) in research training was included in 15% of curricula. One of the common themes involved knowledge-based competency, and three each of the remaining seven involved skills or behaviour-based competencies. There was less clarity and larger variation between specialties in how research competencies were assessed; and what evidence was required for ARCP and CCT to assure competence. 63% (19/30) of curricula from medical specialties had no mention of research requirements within their ARCP guidelines.

Conclusions: Given that the majority of specialty curricula contain consistent themes around core research knowledge, consideration should be given to standardising the delivery and assessment of generic research competencies within ST. Our

Strengths and limitations of this study

- To the best of our knowledge, this is the first review of research training requirements within curricula for specialty training in England.
- Methodology used for categorisation of competencies as knowledge, skills and behaviour-based domains has helped include curricula from all specialties.
- Recommendations from the review are pragmatic and deliverable.
- Review of any regional variation of infrastructure for delivery and assessment of the recommended research training was outside the scope of this study.
- It was not possible to objectively categorise certain requirements into specific themes (hence categorised as 'unspecified') due to vague descriptors within some curricula.

recommendations from this review could form the basis for developing structured research training for specialty trainees involving: (1) a taught course for knowledge-based competencies; (2) clinical placements with CRN teams for practical workplace-based experience and (3) developing research tutors to help support placements and assessment of these competencies.

INTRODUCTION

The National Health Service (NHS) business plan 2013–2016 states, 'NHS England has a mandate commitment to ensure that the new commissioning system promotes and supports participation by NHS organisations and NHS patients in research funded by commercial and non-commercial organisations, to improve patient outcomes and contribute to economic growth'.¹ Requirements

for understanding and involvement in research are set out for the medical profession by the General Medical Council (GMC) to 'provide effective treatments based on the best available evidence'² and 'apply scientific method and approaches to medical research'.³ In addition Health Education England's (HEE's) mandate states that 'HEE should support clinical academic careers for health professionals and also seek to increase numbers of staff across all clinical and public health professions with a proper understanding of research and its role in improving health outcomes, including an ability to participate in and utilise the results of research'.⁴

The GMC in partnership with the Academy of Medical Royal Colleges (AOMRC) are currently working on defined generic professional capabilities (GPCs); one of which is research and scholarship. All doctors in training will be expected to demonstrate a variety of research capabilities.⁵

These commitments require a research ready workforce, with doctors acting as active collaborators in research. Integrated academic training (IAT) for doctors and dentists, supported by the National Institute for Health Research (NIHR), provides a clear structure for training in research leadership.⁶ However, the NIHR-IAT trains a minority of the medical and dental workforce. Successful embedding of clinical research in the NHS requires active participation of a substantially greater proportion of the future workforce, not just those who have undertaken IAT. There is therefore a need to provide high-quality research training to all postgraduate doctors in specialty training (ST) to ensure they acquire the knowledge and skills necessary for effective research participation.

The majority of ST curricula are designed to define the development of competent practice within that specialty, underpinned by assessments and expected outcomes. This provides a means of monitoring progress through the various stages of training. As the curricula are competency-based, they allow trainees to demonstrate the domains of knowledge, skills and behaviours they have acquired for each specified competency. To align with this process, there is a need to standardise the content, delivery and assessment of research training, as per the planned GPCs from the GMC/AOMRC.

Requirements for Certification of Completion of Training (CCT) vary considerably across specialties. Although the levels of evidence required for CCT are set nationally, there are local and regional variations that potentially lead to variations in research competencies between specialties.⁷ To investigate this variation, and with the aim of identifying common core research competencies, we conducted a review of current ST curricula and guidelines for CCT and Annual Review of Competence Progression (ARCP) assessments for each specialty. Based on this review, we make a number of recommendations on the content of research training with an emphasis on the minimum knowledge and skills that can be consistently and reliably delivered across specialties.

METHODS

The project was commissioned by the NIHR Clinical Research Network in North East and North Cumbria (CRN NENC) in collaboration with HEE North East (HEE NE). ARCP and CCT checklists and curricula for ST were obtained from HEE NE in June 2015. These documents were reviewed between June and September 2015 by one of the authors (JP) to extract research training requirements for each specialty.

Review of ST curricula

The initial review was carried out on the curricula for ST shown in [table 1](#).

Each specialty curriculum was searched for competencies related to research training and these competencies were entered onto a spreadsheet. We did identify some themes before the review but these had to be revised once the review started to take account of emerging (novel) themes. Common themes, defined as those appearing in over 70% of the curricula by grouping of competencies under specific headings, emerged from the data during the review process. There were variations between curricula, but generally the language used was sufficiently similar to allow matching to theme. The majority of curricula divided competencies into knowledge, skills or behaviour-based domains and this information was also entered onto the spreadsheet. Once the review was complete, common themes across all the curricula were identified, as listed below:

1. Appraisal of literature
2. Designing research
3. Delivering research
4. Analysis of data
5. Research governance
6. Knowledge of research
7. Communication and application of research.

Subthemes were then identified for each common theme. To enable compilation of a 'core' set of competencies, research training requirements that were deemed specialty specific (ie, a research training requirement that was unique to one specialty) were removed.

Within each theme, wherever possible competence was further defined based on the following common domains:

- ▶ Knowledge—scientific and clinical knowledge;
- ▶ Skills—clinical and technical skills;
- ▶ Behaviours (also known as attitudes)—transferable or generic professional skills.

Review of ARCP and CCT requirements

The ARCP and CCT guidelines were then reviewed (where available) by one of the authors (JP) for requirements related to research training and these were collated by specialty onto the spreadsheet. The requirements were categorised using the common themes identified from the specialty curricula review, with the addition of a common theme of 'unspecified'

Table 1 Final list of specialty curricula reviewed between June and September 2015

| Medicine | Surgery | Laboratory | Psychiatry | Other |
|-----------------------------|--------------------------------|------------------------------------|---------------------------------|----------------------------|
| Acute medicine | Cardiothoracic surgery | Chemical pathology | Child and adolescent psychiatry | Clinical radiology |
| Acute specialties | Core surgical training | Diagnostic neuropathology | Core psychiatry | General practice |
| Acute care common stem | | | | |
| Acute specialties | General surgery | Forensic histopathology | Forensic psychiatry | Obstetrics and gynaecology |
| Emergency medicine | | | | |
| Anaesthetics | Neurosurgery | Histopathology | General adult psychiatry | Ophthalmology |
| Cardiology | Oral and maxillofacial surgery | Immunology | Learning disabilities | Paediatrics |
| Clinical genetics | Otolaryngology | Medical microbiology | Medical psychotherapy | Public health |
| Clinical neurophysiology | Paediatric surgery | Medical virology | Old-age psychiatry | |
| Clinical oncology | Plastic surgery | Paediatric and perinatal pathology | | |
| Clinical pharmacology | Trauma and orthopaedics | | | |
| Core medical training | Urology | | | |
| Dermatology | Vascular surgery | | | |
| Diabetes and endocrinology | | | | |
| Gastroenterology | | | | |
| General (internal) medicine | | | | |
| Geriatric medicine | | | | |
| Genitourinary medicine | | | | |
| Haematology | | | | |
| Infectious diseases | | | | |
| Intensive care medicine | | | | |
| Medical oncology | | | | |
| Medical ophthalmology | | | | |
| Neurology | | | | |
| occupational medicine | | | | |
| Paediatric cardiology | | | | |
| Palliative medicine | | | | |
| Rehabilitation medicine | | | | |
| Renal medicine | | | | |
| Respiratory medicine | | | | |
| Rheumatology | | | | |
| Sport and exercise medicine | | | | |

where it was unclear, from the description, how the requirement should be categorised (eg, 'research/audit activity'). If requirements could not be categorised into a single common theme, they were categorised into all the common themes that were applicable to the description.

A further categorisation of the CCT/ARCP requirements was undertaken based on whether the requirement was predominantly knowledge-based, skills-based or whether it was unclear. For example:

- ▶ *Knowledge*—'Trainees must demonstrate knowledge of research methodology and research governance'.
- ▶ *Skills*—'Trainees should have three peer-reviewed papers (not case reports) published in an indexed journal and three first-author presentations at a regional, national or international meeting during specialty training. The trainee's contribution to each of these pieces of work should have been significant'.
- ▶ *Unclear*—'Special interest/research supervisors reports or supervisor's report'.

RESULTS

Sixty-two ST curricula were reviewed. The common themes for research competencies present in the majority of curricula, as well as whether these were knowledge, skills or behaviour-based, are presented in table 2. Some requirements could not be objectively categorised into a common theme as they were descriptive and broad in scope, for example, 'Trainees must demonstrate knowledge of research methodology and research governance. This could be by completing a research degree or publishing a peer reviewed paper as first author'. In these circumstances requirements were categorised into all the common themes that were applicable to the description. The applicable themes for this example were: appraisal of literature, research governance, background knowledge, and communication and application. Requirement for good clinical practice (GCP) in research training was included in only 15% of curricula. Some specialties had a requirement for GCP within their ARCP/CCT checklist, but had no competency for GCP within the curricula. Some of the research requirements and their descriptors were not clear. For example, 'participates in research' was a requirement for some specialties, but there was no clear definition or guidance as to how this was structured, delivered or assessed. None of the curricula recommended specific assessment tools or methods for research competencies.

There was even less clarity and larger variation between specialties in how research competencies were assessed; and what evidence was required for ARCP and CCT to assure competence (table 3). Competencies present within the ST curricula did not consistently form part of the assessment process. For example, 'appraisal of literature' was present in 97% of ST curricula but was only present in 44% of the curricula as a phrased requirement for ARCP/CCT. Of the 30 medical specialties, 19 had no

mention of research requirements within their ARCP guidelines. Where available, however, these were further categorised into whether they were predominantly knowledge or skills-based or 'unclear' (table 4). Only the surgical specialties clearly stated specific CCT requirements for research, with interesting variations across these surgical specialties.

DISCUSSION

The review of specialty curricula indicated that the majority contained a consistent theme around core knowledge pertaining to clinical research. There was inconsistency in the requirements for, and the provision and assessment of, workplace-based practical experience in the conduct of clinical research; and there was little guidance and support available to help educational supervisors (and ARCP panels) appraise research skills and to ensure consistency in these appraisals across specialties.

The NHS Constitution, published in March 2012 and updated in 2015, clearly states the service's commitment to innovation and to the promotion, conduct and use of research to improve the current and future health and care of the population.⁸ The Handbook to the NHS Constitution explains how these pledges will apply to research: 'Research is a core part of the NHS. Research enables the NHS to improve the current and future health of the people it serves'.⁹

Active engagement of the current and future NHS workforce in clinical research is essential to achieve these objectives. While current ST maintains a focus on trainees achieving clinical competencies, our review highlights that there is no uniformity in how research training is delivered or assessed. The benefits and importance of trainees' involvement in clinical trials has been reported by some specialty trainees.^{10 11}

Given that the majority of specialty curricula contain a consistent theme around core research knowledge, this could be taught (and knowledge tested) as part of a course. Currently, specialty trainees within HEE NE have the opportunity of attending a 2-day face-to-face course entitled 'Clinical Research in the NHS', commissioned by HEE NE and run by the CRN and Newcastle University. However, it may be feasible to deliver the content in the future via the web. In addition, there is an opportunity to explore how workplace-based practical experience in the conduct of clinical research might be delivered for trainees to acquire skills and behaviour-based competencies. Given virtually all high-quality research is delivered by specialty teams supported by the NIHR-CRN, there is obvious merit in undertaking this element of research training in partnership with the CRN. This would need to incorporate GCP training, and may include a limited placement of specialty trainees to work with principal investigators and CRN delivery teams in order to gain practical experience of screening and recruiting patients to NIHR portfolio studies. The

Table 2 Summary of categorisation of research competencies into common themes and domains from specialty training curricula reviewed between June and September 2015

| Common theme | Subthemes (specific competencies) | Proportion of curricula with common theme (%) | Common domains |
|---|--|---|----------------|
| Appraisal of literature | Critically appraise literature/write a scientific paper/report | 97 | Skills |
| Designing research | Ethical conduct/approval guidelines/informed consent | 92 | Behaviour |
| Delivering research | Ethical conduct/approval guidelines/informed consent | 90 | Behaviour |
| Analysis of data | Write a scientific paper or report/analyse data | 94 | Skills |
| Research governance | Ethical conduct/approval guidelines/informed consent/patient confidentiality | 71 | Behaviour |
| Knowledge of research | Research principles/methods | 97 | Knowledge |
| Communication and application of research | Critical appraisal of research/translation to clinical practice | 97 | Skills |

Table 3 Frequency of ARCP/CCT requirements for research competencies within the 62 specialty curricula reviewed between June and September 2015

| ARCP/CCT theme | Percentage |
|---|------------|
| Appraisal of literature | 44 |
| Designing research | 26 |
| Delivering research | 16 |
| Analysis of data | 40 |
| Research governance | 10 |
| Knowledge of research | 18 |
| GCP | 10 |
| Communication and application of research | 42 |
| Unspecified | 34 |

ARCP, Annual Review of Competence Progression; CCT, Certificate of Completion of Training; GCP, good clinical practice.

duration of this placement will depend on the research competencies to be achieved, the temporal demands of clinical training and the research activity within the specialty and the local educational provider where the trainee is placed. However, given these competencies are generic, there is no necessity for the placement to be specialty-specific.

In order to ensure consistency in assessment of research capabilities across specialties, consideration should be given to develop research tutors within regional training programmes. These tutors could, in partnership with the CRN, develop specific assessment tools to help ARCP panels assess relevant research competencies. While such tools could be used to help guide assessments within regions, they would need to mirror any potential output from the GMC/AOMRC GPC group.

Review of any regional variation of infrastructure for delivery and assessment of the recommended research training was outside the scope of this study, which may limit its generalisability. It was not possible to objectively

Table 4 Breakdown of ARCP/CCT requirements for research competencies into 'knowledge', 'skills' or 'unclear' categories reviewed between June and September 2015

| Common themes | Knowledge % | Skills % | Unclear % |
|---|-------------|----------|-----------|
| Appraisal of literature | 2 | 90 | 8 |
| Designing research | 0 | 18 | 82 |
| Delivering research | 0 | 11 | 89 |
| Analysis of data | 0 | 85 | 15 |
| Research governance | 45 | 10 | 45 |
| Knowledge of research | 95 | 5 | 0 |
| GCP | 73 | 0 | 27 |
| Communication and application of research | 51 | 40 | 9 |
| Unspecified | 0 | 0 | 100 |

ARCP, Annual Review of Competence Progression; CCT, Certificate of Completion of Training; GCP, good clinical practice.

categorise certain requirements into specific themes (hence categorised as 'unspecified') due to vague descriptors within some of the curricula. Despite these limitations, the principles of standardisation based on review of the curricula remain, but the mode of delivery of research training may have to be adapted to the infrastructure and resources within regions.

In summary, in order to increase the quality and consistency of research training, consideration should be given to standardising the delivery and assessment of generic research competencies within ST. This could be achieved through: (1) a taught course for knowledge-based competencies; (2) creation of clinical placements with CRN research teams for practical workplace-based

experience and (3) developing a cadre of research tutors to help support placements and the assessment of these competencies.

Within the North East of England, HEE NE has acted on these suggestions. In addition to offering a taught course, a scheme involving research placements with CRN research teams is being piloted in four specialty areas, approved by the respective schools, to test the process and gain feedback. Further recommendations on wider adoption can then be made, but we recognise there may be challenges to standardise this across every region given variations in local geographical infrastructure, while ensuring all GMC standards are met and hopefully exceeded.

CONCLUSIONS

Our review of ST curricula has identified that standardisation of delivery and assessment of generic research competencies within ST would be desirable for quality assurance purposes, and the commonality across specialty curricula identified makes standardisation feasible. Our recommendations from this review can form the basis for developing structured research training for specialty trainees.

Contributors SR and AR developed the idea for the project with BW. AR, JP and PW defined the methodology and protocol for the review. JP performed the data extraction and categorisation. AR drafted the manuscript with contributions from all coauthors. All authors approved the final manuscript for submission.

Funding This research was supported by the NIHR CRN - North East & North Cumbria; no external grant was received from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests AR reports grants from DePuy, other from JRI, grants from NIHR, grants from ORUK, outside the submitted work.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

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